

Cisco IT Methods

Cisco Digital Ceiling

Introduction

A common goal of facilities managers is to run their buildings with high service levels, yet also deliver cost savings and environmental benefits through reduced power consumption. In recent years, using the corporate network to connect systems for managing and automating heating, ventilation, and air conditioning (HVAC) and other building services has supported Cisco's progress toward these goals. Now we want to extend these benefits by taking advantage of lighting powered by the network with capabilities for improving building efficiency while enabling new and better user experiences.

"One of our goals is to create an appealing atmosphere that will help our employees work more comfortably and effectively," says Nataliya Novitskaya, project manager, Cisco IT.

Solution

We are beginning deployment of the Cisco® Digital Ceiling solution, which helps different building systems converge on a single IP network. Because the lights and other building systems are connected via a Cisco Catalyst® Switch, they can be monitored and managed together by the enterprise network management system. The Digital Ceiling solution also allows users to personalize their environment with a smartphone app.

Cisco's deployment includes new lighting fixtures that use Power over Ethernet (PoE) technology to power LED lights instead of traditional electrical wiring. Cisco Universal Power over Ethernet (UPOE) extends the IEEE Power over Ethernet Plus (PoE+) standard to double the power per switch port to 60 watts. It can extend resilient network power to a broad range of devices, including LED lights.

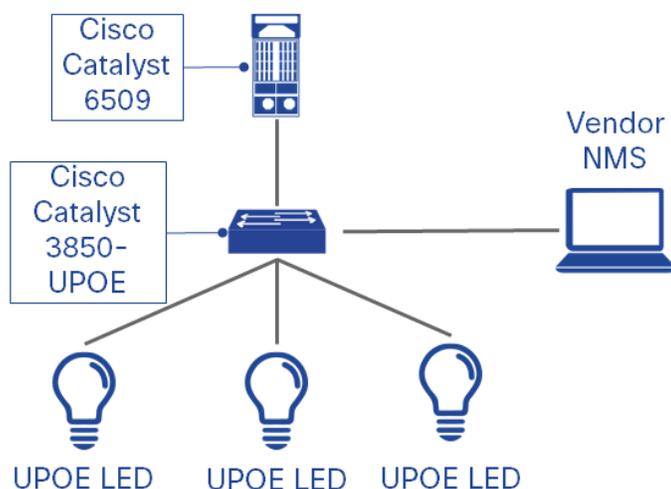
Deployment

As of early 2016, Cisco IT and the Cisco Workplace Resources (WPR) group deployed the Cisco Digital Ceiling in 46 meeting rooms across two buildings in our San Jose, California, headquarters campus. This deployment was initially a proof of concept to evaluate the compatibility of fixtures from different manufacturers as well as to determine implementation and support requirements. Deployment in additional Cisco offices globally is planned throughout 2016, with expectations that network-powered building systems such as lighting will eventually become common in new facilities and an option to evaluate for retrofit into existing office space.

As shown in Figure 1, each managed light fixture connects over a Cat 6A Ethernet cable to an individual PoE port in the building's Cisco Catalyst Switch. For testing purposes, Cisco IT initially configured these connections into a separate VLAN. In full deployment, these connections will be configured in the general infrastructure VLAN.

Figure 1. Digital Ceiling Connectivity to Cisco Catalyst Switches

Digital Ceiling - Network Diagram



The initial deployment generated positive feedback from users. Using the Cisco Smart Spaces app on their mobile devices, employees can adjust the brightness and color of the room's lights. They can also save their lighting preferences in the application to be applied automatically when they check in to a room.

Security

We needed to define security requirements that will help prevent any lighting fixtures on the network from being used by hackers as an entry point to the internal Cisco network. At a minimum, we require that all lighting fixtures we use comply with the security requirements of IPv6 and 802.1x standards.

In locations where Cisco leases office space, we negotiated with the building owner about which party is responsible for installing the lights and whether they will be connected to the Cisco network or the landlord's network. In most cases, a secure connection for lighting management and the user application is needed between the management systems and networks used by Cisco and the landlord.

Management

The Digital Ceiling offers features to manage lights via the enterprise network management system, as well as user settings in the smartphone app.

Service and Support

The Cisco WPR Facilities Response Center handles all problem reports about lighting. For the lighting fixtures, the facilities team can look at port information to see if the fixture is operational and dispatch an on-site technician if needed. However, if the fixture is working correctly, the team asks Cisco IT to troubleshoot the network connectivity to the switch.

Benefits

We expect that broader deployment of network-powered lighting and other elements of the Cisco Digital Ceiling solution will produce several benefits.

Cost savings. We anticipate lower wiring costs for building construction if the facility can make extensive use of PoE-connected lighting and building systems. Additionally, we expect lower expenses whenever changes are made in a workspace because the lighting can be reconfigured through software instead of physical rewiring.

Remote management and support. Fewer incidents will need dispatch of on-site maintenance staff because many problems with this type of lighting fixture can be detected, diagnosed, and solved through the network management system.

Better user experience. New LED technologies can mimic natural light, which has been proven to improve employee performance. Using the smartphone app, employees can personalize meeting rooms for lighting color and dimming levels. “Being able to easily select the right lighting for the kind of work that you’re doing at the time you’re doing it provides a better user experience and more productive working environment,” says Ali Ahmed, senior manager, Cisco WPR.

Lessons Learned

Here are a few insights based on our initial experience deploying the Cisco Digital Ceiling solution:

Offer training and education. As more smart systems are installed in buildings, facilities management and maintenance personnel will need to become more savvy about managing IT devices and security. For lighting powered by the network, this means training staff to recognize that when a light doesn’t come on, the problem source may be due to a network issue, not a lamp that needs to be replaced. Employees may need training resources to help them use the Digital Ceiling features effectively.

Local building development officials, fire marshals, contractors, and related parties may need education about Internet-connected lighting and the impact on their regulatory and safety concerns as well as work activity.

Choose high-impact locations. Not all spaces (e.g., stairwells) need the management features or adaptability of connected light fixtures. Instead, consider this solution first for meeting rooms and other spaces where flexible lighting can have a noticeable impact on work experience. The knowledge gained from these spaces will help to identify which additional building areas may be suitable for the Digital Ceiling framework.

For More Information

[Cisco Digital Ceiling](#)

Learn more about how Cisco IT and WPR are implementing the Cisco Digital Ceiling and Smart Spaces:

<http://www.cisco.com/c/en/us/solutions/collateral/enterprise/cisco-on-cisco/i-en-01122015-smart-spaces.html>

To read additional Cisco IT case studies on a variety of business solutions, visit Cisco on Cisco: Inside Cisco IT

<http://www.cisco.com/go/ciscoit>

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